



**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re U.S. Patent Application of )  
PETERS et al. )  
Application Number: 10/820,695 ) Art Unit 1751  
Filed: April 9, 2004 ) Examiner Gregory R. Delcotto  
For: PROCESS AND APPARATUS FOR )  
REMOVING RESIDUES FROM THE )  
MICROSTRUCTURE AN OBJECT )  
Attorney Docket No. AIRP.0001 )

Commissioner of Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

**DECLARATION OF INVENTOR UNDER 37 C.F.R. §1.132**

Sir:

I, Matthew I. Egbe, am a co-inventor of the invention disclosed and claimed in the above identified application, and hereby declare as follows:

I have reviewed the above-referenced patent application and the claims of record, and have carefully considered the Examiner's rejections under 35 U.S.C. §103(a) based on obviousness over Mullee (U.S. Pat. 6,306,564) in view of Vaartstra (U.S. Pat. 6,242,165) and Skee et al. (U.S. Pat. 5,989,353); WO 01/33613 in view of Vaartstra and Skee; Mullee in view of Vaarstra and Skee et al.; WO 01/33613 in view of Vaarstra and Skee et al. and further in view of McCullough; and Mullee in view of Vaarstra and further in view of McCullough or WO 01/33613. I respectfully disagree with the Examiner's rejections.

As a co-inventor, it is my understanding that the claimed invention provides a composition for removing residues from the microstructure of an object comprising: carbon dioxide; an additive for removing the residues comprising a fluoride having a formula  $NR_1R_2R_3R_4F$ , where each of  $R_1$ ,  $R_2$ ,  $R_3$ , and  $R_4$  is an alkyl group, and a basic compound including a quaternary ammonium hydroxide; and a co-solvent for dissolving said additive in said  $CO_2$  at a pressurized fluid condition, wherein at least said carbon dioxide is in a supercritical state so as to maintain the composition comprising said carbon dioxide, said

additive and said co-solvent as a single composition, wherein weights percents of said carbon dioxide, said additive and said co-solvent are such that the composition comprising said carbon dioxide, said additive and said co-solvent effectively penetrates residues on the microstructure, and wherein the fluoride is selected from tetramethylammoniumfluoride, tetraethylammonium-fluoride, tetrabutyl-ammoniumfluoride, tetrapropylammoniumfluoride, choline fluoride, and mixtures thereof.

The Examiner's assertion that Vaastra teaches that the equivalence of tetramethyl ammonium fluoride to ammonium fluoride in a similar cleaning composition, and further Mullee teaches the use of ammonium fluoride. However, contrary to the Examiner's assertion, ammonium fluoride is not equivalent to tetramethyl ammonium fluoride in the cleaning composition in a supercritical state. In the supercritical composition, a salt portion of the composition precipitates out and it will not be present to buffer the composition. Once ammonium fluoride reaches equilibrium loses, ammonium fluoride gives off ammonia ( $\text{NH}_3$ ) gas leaving a fluoride ion present thereby forming HF that would make the composition more acidic in nature. A more acidic pH cleaning composition effects the cleaning performance and starts to etch any dielectric or other layers present within the substrate. Therefore, ammonium fluoride is not equivalent to tetramethyl ammonium fluoride in the cleaning composition in a supercritical state.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statement were made with the knowledge that willful false statements and the like so made are punishable by fine, or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the above-captioned application and any patent to issue thereon.

Respectfully submitted this 2 day of January, 2008

